

**EDUCATION, SOCIAL COHESION, AND
ECONOMIC GROWTH**

Mark Gradstein and Moshe Justman

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Monaster Center for Economic Research
Ben-Gurion University of the Negev
P.O. Box 653
Beer Sheva, Israel

Fax: 972-7-6472941
Tel: 972-7-6472286

Education, Social Cohesion and Economic Growth

Mark Gradstein and Moshe Justman*

Abstract

Our analysis of the contribution of education to growth recognizes its dual role of building human capital and promoting a common culture. It indicates that when different cultural groups separately determine the cultural orientation of their school curricula this may result in excessive polarization and sub-optimal growth. The optimal trajectory involves a gradual, reciprocal convergence of school curricula towards the middle, but may be difficult to implement in a political context in which curricula are determined by legislative bargaining. Coercive centralization then results in overly rapid homogenization and may not be superior to a decentralized school system.

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Theoretical developments that emphasize the central role of human capital in economic growth have led to an increased appreciation of the extent to which education contributes to growth, but may have biased our understanding of the nature of its contribution.¹ A general emphasis on the instrumental role of education in transmitting knowledge downplays its effect on growth through its role as a socializing force. In this paper we seek a better understanding of this role as it bears on the positive political economy of

public schooling and growth, and on normative analyses of education systems in multicultural societies.

The economic benefits of education as a socializing force are realized in various ways. Instilling civic virtues from an early age, through education, can reduce the cost of enforcing desirable social norms.² Relatedly, when society is divided along ethnic or religious lines, uniform schooling in a common culture can lessen the potential for redistributive conflict among distinct social groups.³ The present paper focuses on a third benefit of common socialization: the role of state schooling in reducing transaction costs by shrinking the “social distance” between individuals in the economy. As Edward P. Lazear (1999) points out, the absence of a common culture inhibits the ability of economic agents to interact with each other and undermines the efficiency of production and exchange. While some degree of cultural diversity may be generally beneficial for economic performance,⁴ here we focus on the detrimental effect of excessive cultural polarization.

The economic advantages of reducing cultural distances in society are illustrated by empirical evidence from a variety of sources. William Easterly and Ross Levine (1997) argue that ethnic heterogeneity is the source of poor economic performance in African countries, finding that it is associated with low school achievement, reduced labor productivity and slow growth. Alberto Alesina et al. (1999) observe similar effects in their study of local communities in the United States, finding that racially heterogeneous communities tend to spend less on productive public services, including education. Stephen Knack and Philip Keefer (1997) and Jonathan Temple and Paul A. Johnson (1998) find a positive association between social capital and growth in a cross section of countries; inasmuch as cultural cohesion promotes the creation of social capital this, too, is consistent with our assumption. Finally, Chaim Fershtman and Uri Gneezy (2001) and Edward L. Glaeser et al. (2000) present experimental evidence on a negative relationship between ethnic

heterogeneity and trust, the former explicitly focusing on its adverse effect on the efficiency of economic transactions.

This paper examines the relation between social cohesion, education and growth in the context of a dynamic model in which the productivity of economic transactions depends on the social distance between the transacting agents, and expected individual income decreases as a function of average social distance from one's cohort (from some point on). These cultural distances are determined by the social orientation of the schooling that parents provide their children. Parents contribute to their children's material well-being by raising them more closely in line with the mainstream, common culture, but this carries a psychic cost of diluting the traditional values in which the parents themselves were raised and thus weakening the bond between parent and child.

Assuming that social distance is a symmetric function, this implies that parents' decisions on the social orientation of their children have external effects on the productivity of other children. Hence, in an uncoordinated equilibrium, social polarization is likely to be excessively large, and growth excessively slow, indicating scope for a Pareto-improving, concerted cultural convergence of school curricula that reduces transaction costs in the next generation and increases growth. The gains to parental utility from the increased material benefits that their children derive from others drawing closer to them will offset the direct psychic cost they suffer from the widened generation gap. The optimal mode of government intervention involves regulation of multi-cultural education in such a way that social differences are smoothed out reciprocally and gradually, and not always fully.⁵

Implementation of such an optimal trajectory poses obvious difficulties. A dynamic contract between distinct social groups that regulates the cultural content of their respective school systems may be difficult to formulate and monitor, and its enforcement will depend on the vagaries of specific political processes. Our analysis of such political implementation,

through representative democracy, reveals that it may lead to overly rapid homogenization and does not necessarily result in a welfare improvement compared to a decentralized school system. This suggests that caution is in order when recommending centralized intervention in schooling: careful attention should be paid to the political conditions that constrain implementation.

The socializing role of education also provides a key to understanding the positive political economy of public schooling—explaining the ubiquitous role of the public sector in the provision of primary and high school (K-12) education. Several recent efforts that focus on the instrumental contribution of schooling to human capital implicitly attribute the extensive involvement of the public sector in education to its advantages in internalizing the external benefits of education, relaxing credit constraints and redistributing income. However, these advantages could largely be realized without direct administrative intervention in the schooling process, e.g., through the use of subsidies or vouchers.⁶ The socializing role of education indicates a need for more direct intervention, inasmuch as cultural content is difficult to monitor at arm's length without the direct controls of public administration (Michael Kremer and Andrei Sarychev, 1998).

Our emphasis on socialization as a driving force of public education accords with historical experience. The emergence of government intervention in schooling in the eighteenth and nineteenth century was closely tied to its socializing role (Harry G. Good and James D. Teller, 1969, Andy Green, 1990). Autocratic rulers in eighteenth-century Prussia and Austro-Hungary used it to strengthen their subjects' allegiance to the state. In nineteenth-century France and Germany, centralized schooling contributed to the forging of unified national identities. In Great Britain, the ruling elites viewed socialization of the working classes through compulsory primary education as a necessary concomitant of the extension of the franchise (Albert V. Dicey, 1914). In the United States, the expansion of public schooling

in the early twentieth century contributed significantly to the cultural and economic assimilation of large waves of immigration (Newton Edwards and Herman G. Richey, 1963). More recently, education has played an important role in efforts to forge new national identities in the multi-ethnic developing countries that emerged in the second half of the twentieth century: Singapore is a successful example in this regard (R. Murray Thomas, et al., 1980); the African experience has been less fortunate (Easterly and Levine, 1997).

Earlier work by economists on the socializing role of schooling includes the seminal contribution of Samuel Bowles and Herbert Gintis (1976), the more recent work by John R. Lott, jr. (1990), and, methodologically closest to the present paper, Kremer and Sarychev's (1998) dynamic model of ideological evolution. We extend Kremer and Sarychev's contribution in two regards. First, our model combines accumulation of instrumental human capital with the evolution of social orientation, enabling us to link decisions on the social orientation of the education system to growth performance. Second, our analysis draws attention to the political constraints that bear on the relative effectiveness of centralized versus decentralized schooling. This second contribution of our paper is related to recent work by Stephen Coate (1997), Timothy J. Besley and Coate (1998) and Tore Ellingsen (1998) who similarly point to the possible negative effects of centralization in other contexts.

In the following section we set out the basic definition of our model. We characterize the decentralized equilibrium in Section 3, and compare it to the social optimum in Section 4. Section 5 examines the problem of political implementation. Empirical applications are discussed in Section 6, and Section 7 concludes.

2 Definition of the model

We assume an overlapping generations (OLG) economy⁷ in discrete time t populated by a continuum of households of unit measure indexed by i and represented by the unit interval,

each consisting of a parent and child. The income of parent i in period t is denoted y_{it} , and we assume that initially all parents are exogenously endowed with the same income y_0 . Individuals also have social characteristics—language, culture, ideology—which we assume can be captured by a single parameter $0 \leq p_{it} \leq 1$ that denotes the social orientation of parent i in period t . We assume for simplicity that generation 0 comprises two uniform social groups of equal size, “reds” and “greens”, with initial social characteristics $p_{r0} < p_{g0}$ located symmetrically in the unit interval, $p_{r0} = 1 - p_{g0}$. The initial degree of social polarization is then $\Delta_0 = p_{g0} - p_{r0}$.

Parents make all household decisions. In each period they divide current income y_{it} between consumption c_{it} and instrumental investment in their children’s human capital h_{it+1} ; and they choose the social orientation of their children’s schooling p_{it+1} ,⁸ thus determining the child’s social distance from its parent, $|p_{it} - p_{it+1}|$, and from other individuals j in its cohort, $|p_{it+1} - p_{jt+1}|$. The distance from the parent determines the degree of alienation between parent and child, $C(|p_{it} - p_{it+1}|)$, which directly reduces parental utility.⁹ We assume that C is increasing and convex with $C(0) = 0$.

The social distance between an individual and other members of its cohort affects the productivity of its instrumental human capital. This is captured by the metric $D(|p_{it+1} - p_{jt+1}|) \geq 0$ that represents the expected productivity of a transaction between i and j . It can be thought of as a function of two opposing forces: (1) the probability that, given the opportunity to cooperate, i and j will effect a successful transaction between them, which we assume to be a decreasing function of the cultural distance that separates them;¹⁰ and (2) the advantages of cooperation when a transaction has been successfully concluded, which may increase with cultural diversity.¹¹ We set $D(0) = 1$, and while allowing that D may increase with cultural distance at low levels of polarization, require that it is decreasing from some point on, i.e., when $|p_{it+1} - p_{jt+1}|$ exceeds some threshold level $\underline{\Delta}$.¹² We further assume that D is twice

differentiable and concave with respect to social heterogeneity, which holds when the advantages of cooperation increase at a decreasing rate while the probability of effecting a successful transaction, as a function of cultural distance, decreases at an increasing rate; this implies that $\underline{\Delta}$ is a global maximum of D . Finally, to focus our analysis on cases of excessive polarization we posit that the initial level of polarization is such that $\Delta_0 > \underline{\Delta}$.

Individual i 's output in period t is assumed to result from numerous chance encounters with other individuals in its cohort that create opportunities for economic cooperation so that the productivity of its human capital is closely approximated by the expected value of D .¹³ Let $\Pi(p_{it}; \mathbf{p}_t)$ denote individual i 's expected value of D in random encounters with other members of its cohort in period t

$$(1) \quad \Pi(p_{it}; \mathbf{p}_t) = \int D(|p_{it} - p_{kt}|) dF_t(k)$$

where \mathbf{p}_t represents the social orientation of all individuals in the cohort and F_t is the cumulative distribution function of cultural orientation in period t .¹⁴ Individual expected income y_{it} is then jointly determined by the product of this average value and instrumental human capital:

$$(2) \quad y_{it} = A h_{it} \Pi(p_{it}; \mathbf{p}_t)$$

where A is an exogenous technology parameter to which all individuals have access.

The utility of the parent of household i in period t is an increasing function of current household consumption c_{it} and of the expected income of its child in the next period y_{it+1} , and a decreasing function of the social distance between parent and child, $C(|p_{it} - p_{it+1}|)$:

$$(3) \quad U(c_{it}, p_{it}, y_{it+1}) = \log(c_{it}) - C(|p_{it} - p_{it+1}|) + \delta \log(y_{it+1})$$

where y_{it+1} is given by (2) and $0 < \delta < 1$ reflects the extent of parental altruism. Utility is maximized by each parent subject to the budget constraint:

$$(4) \quad y_{it} = c_{it} + h_{it+1}$$

3 Decentralized education

Under *decentralized* (or *sectoral*) *schooling* there exist separate schools for the members of the two groups, and all educational decisions are made communally within each group, independently of the other group. This implicitly assumes that the groups are able to successfully overcome internal free riding incentives, and we further assume that they are constrained to provide all members of the group with the same schooling.¹⁵ As both groups are initially uniform this implies that they will remain so in subsequent periods, and we denote their respective social orientations in period t by p_{rt} and p_{gt} , and the degree of social polarization by $\Delta_t = |p_{gt} - p_{rt}|$. The parents of each group choose h_{jt+1} and p_{jt+1} , $j=r,g$ in each period so as to maximize their respective utilities given each group's anticipation of the other group's choice, and we require that in equilibrium these anticipations are realized. Because the social orientations of the two groups are initially symmetric around $\frac{1}{2}$ the same also applies in all subsequent periods, so that Δ_t fully determines p_{rt} and p_{gt} : $p_{rt} = \frac{1}{2} - \frac{1}{2} \Delta_t$ and $p_{gt} = \frac{1}{2} + \frac{1}{2} \Delta_t$; and $|p_{jt} - p_{jt+1}| = \frac{1}{2} (\Delta_t - \Delta_{t+1})$ for $j = r, g$.

To complete the characterization of the household's optimization problem note that it is subject to two additional implicit constraints stemming directly from the assumption that polarization is harmful in the relevant range, where D is decreasing. In this range, it can never be optimal for parents to choose for their children a social orientation more extreme than their own as this would be twice harmful, increasing the generation gap between parent and child and decreasing the child's future income. By similar reasoning, households never reduce the level of social polarization below $\underline{\Delta}$, the level at which productivity is maximal. Therefore (see Figure 1)

$$(5) \quad p_{rt} \leq p_{rt+1} \leq \frac{1}{2} - \underline{\Delta} \leq \frac{1}{2} + \underline{\Delta} \leq p_{gt+1} \leq p_{gt}$$

Thus the degree of social polarization is non-increasing over time.

INSERT FIGURE 1 ABOUT HERE

Maximization of (3) with respect to h_{jt+1} and p_{jt+1} , subject to constraints (4) and (5) yields the following first order conditions at interior points along the equilibrium transition path:

$$(6) \quad h_{jt+1} = [\delta/(1+\delta)] y_{jt}$$

$$(7) \quad C'(p_{jt} - p_{jt+1}) + \delta \Pi'(p_{jt+1}; \mathbf{p}_{t+1}) / \Pi(p_{jt+1}; \mathbf{p}_{t+1}) = 0 \quad j = r, g$$

As education is uniform within each group, we obtain from equation (1):

$$(8) \quad \Pi(p_{jt+1}; \mathbf{p}_{t+1}) = \frac{1}{2} [1 + D(\Delta_{t+1})] \quad j = r, g$$

$$(9) \quad \Pi'(p_{jt+1}; \mathbf{p}_{t+1}) = \frac{1}{2} D'(\Delta_{t+1}) \quad j = r, g$$

Next period income is then identical across individuals, and equals

$$(10) \quad y_{t+1} = \frac{1}{2} A [\delta/(1+\delta)] [1 + D(\Delta_{t+1})] y_t$$

We say that the economy is in a steady state when the degree of social polarization is stationary, i.e., when $\Delta_t = \Delta_{t+1}$. The monotonicity of Δ_t along the equilibrium path, from (5), implies that the economy must converge to a steady state. Equation (10) implies that the growth rate, $\lambda_t = y_{t+1}/y_t$ is declining in the degree of social polarization. Hence, along the equilibrium transition path, before the economy is in a steady state, social polarization is decreasing and the growth rate is increasing. Combining (7), (8) and (9) yields the following implicit characterization of the evolution of social orientation along interior points on the equilibrium transition path, where $\Delta_t > \Delta_{t+1}$:

$$(11) \quad C'(\frac{1}{2}(\Delta_t - \Delta_{t+1})) + \delta D'(\Delta_{t+1}) / [1 + D(\Delta_{t+1})] = 0$$

A steady state is characterized by setting $\Delta_t = \Delta_{t+1} = \Delta$ in (11), giving¹⁶

$$(12) \quad C'(0) + \delta D'(\Delta) / [1 + D(\Delta)] = 0$$

Uniqueness then follows by differentiating (11), from which $0 < d\Delta_{t+1}/d\Delta_t < 1$.¹⁷ Under these conditions the steady state is unique and does not depend on initial conditions.

Proposition 1. If $\Delta_0 > \underline{\Delta} > 0$ and Δ_0 is not a steady state then

- (a) Social differences diminish and the growth rate increases along the equilibrium path.
- (b) The equilibrium path converges to a unique steady state.
- (c) Steady-state growth is inversely related to social differentiation in the steady state.¹⁸

Proposition 1 recalls Roland Bénabou's (1996) analytical result that heterogeneity in productivity under decentralized schooling can be detrimental to growth. It is also related to George J. Borjas' (1992) empirical finding that accumulation of human capital is affected by ethnic externalities. It suggests the testable hypothesis that wage differentials between different ethnic groups diminish from one generation to another.

Total differentiation of equation (12) implies that the degree of polarization in the steady state is inversely related to the incremental psychic cost of the distance between parent and child and varies directly with the incremental material cost of the social distance between members of the same cohort. This suggests that religious differences, which have a strong personal significance but may have less of an impact on economic transactions, are more likely to be preserved in separate school systems, while language differences, which are of greater economic significance but generally of less personal significance, are more likely to be erased.

Note that in taking individual productivity as determined by an average measure of social heterogeneity we implicitly assume that all interactions in the economy are equally likely. But this might not always be the case. In the extreme case, under complete social exclusion, individuals might be constrained to deal only with members of their own group, in which case there would be no incentive for cultural convergence and children would fully retain their parents' cultural identities. This raises an important set of issues on the relation between economic and social incentives for social integration versus segregation, for

openness versus exclusion. While these issues lie outside the scope of this paper, our approach provides a possible framework for their consideration.¹⁹

4 Efficiency

We next examine the welfare implications of decentralized schooling. As an efficiency benchmark, consider the Pareto-optimal trajectory of social orientation of schooling, p_{it+1} , and investment in instrumental human capital, h_{it+1} , subject to a balanced budget constraint in each period. Because of the inherent symmetry between the two groups and the uniformity of households within groups we limit our attention to Pareto-optimal allocations that have these properties, i.e., that are uniform within social groups and symmetric around $\frac{1}{2}$. All individuals will then have the same amount of instrumental human capital in each period, and income will evolve according to the following equation:

$$(13) \quad y_{t+1} = A h_{t+1} \Pi(p_{rt+1}, p_{gt+1}) = A h_{t+1} [1 + D(\Delta_{t+1})] / 2$$

Note that utility is affected by the actions of other individuals in one's cohort, but not by the future actions of the next generation.²⁰ This absence of intertemporal dependence implies that efficient allocations can be characterized by independent maximization of utility in each period,

$$(14) \quad U_t = \log(c_t) - C(\frac{1}{2}(\Delta_t - \Delta_{t+1})) + \delta \log(y_{t+1})$$

subject to (4) and (13). Solving this, we obtain that socially optimal accumulation of human capital is given by:

$$(15) \quad h_{t+1} = [\delta/(1+\delta)] y_t$$

and the intertemporal evolution of social orientation at interior points is given by

$$(16) \quad \frac{1}{2} C'(\frac{1}{2}(\Delta_t - \Delta_{t+1})) + \delta D'(\Delta_{t+1}) / [1 + D(\Delta_{t+1})] = 0$$

Comparing the socially optimal solution to the equilibrium transition path under sectoral schooling we observe that polarization is reduced more slowly under sectoral schooling. Thus under sectoral schooling polarization is excessive and growth is slower in

each period than along the optimal path. Employing the same mode of analysis used in the previous section, and recalling (11), we find that the optimal steady state, Δ^* , is unique (provided $\underline{\Delta} > 0$ and Δ_0 is too large to be a steady state) and characterized by:

$$(17) \quad \frac{1}{2} C'(0) + \delta D'(\Delta^*) / [1 + D(\Delta^*)] = 0$$

where $0 < \Delta^* < \Delta_0$. Comparing this to the steady state under decentralized schooling reveals that the optimal steady state is characterized by less polarization and stronger growth.²¹

The reason for the inefficiency of decentralized schooling is that each community disregards the benefits of reduced polarization for the rival community when making its educational decisions. The optimal path described by (16) can be interpreted as a regime of coordinated decentralized schooling in which the two communities maintain separate curricula that are centrally regulated so as to avoid excessive polarization. Summing up,

Proposition 2. If $\Delta_0 > \underline{\Delta} > 0$ and Δ_0 is not a steady state, then in each period decentralized schooling results in excessive polarization and slower growth than could optimally be achieved through coordination, and the decentralized steady state is characterized by excessive polarization and slower growth compared to the optimum.

5 Political implementation

Our analysis indicates an important normative role for government education policy in coordinating a reciprocal homogenization of sectoral school systems. However, this may be difficult to achieve. One type of difficulty that we do not explicitly pursue here arises because agreements between sectors regarding the dynamic evolution of curriculum content must be difficult to formulate and monitor.²² Here we focus on another type of difficulty that arises in a polarized context in which all agents are identified with one group or another: the absence of an impartial enforcement agency. When this is the case, the cultural orientation of the education system is shaped by political action reflecting the balance of political power as it is

mediated by institutional factors.²³ This leads us to ask specifically how might the parameters of the political process shape education policy under representative democracy with legislative bargaining, and compare its results to decentralized schooling and to the Pareto-optimal trajectory absent political constraints.

Clearly, much depends on the details of the political process, and these can be modeled in more than one way. We adopt a reduced-form model of legislative bargaining introduced by Coate (1997) and Besley and Coate (1998) to study issues in fiscal federalism. Assume there is a government that determines the size of the education budget and the social orientation of the two sectoral school systems in each period. In this approach, state schooling is perceived as an alternative to pure sectoral schooling as described in the previous section. Let τ_t denote the tax rate in period t . Then if all tax revenues are used to provide a uniform level of schooling, it follows immediately from our assumption of logarithmic preferences that all households desire the same tax rate $\tau_t = \delta/(1+\delta)$. Assume further that government consists of a representative of each of the two groups, and that decisions on the orientation of schooling are reached through a bargaining process between them in which the first move is a policy proposal comprising a pair of social orientations—one for schools of the proposer’s own constituency, another for those of the rival constituency.

The outcome of the process will then depend on the ability of the first mover to impose its will on the other side. One approach in the literature on legislative bargaining, which we first consider, has the ruling coalition gaining maximal power and capturing the entire surplus (e.g., William H. Riker, 1962, and David P. Baron and John Ferejohn, 1989), i.e., we assume that the first-mover has the coercive power to force the other side to accept its proposal. Clearly, the proposer will then select its own social orientation for its own school system and offset the social orientation of the other group so as to maximize productivity; say the proposer represents the red community, then it will set $p_{rt+1} = p_{rt}$ and $p_{gt+1} = p_{rt} + \underline{\Delta}$. The equal size of the two

groups leads us to assume that ex ante each side has an equal probability of being the first mover, and so all parents have the same expected utility:²⁴

$$U_t^c = \log[y_t/(1+\delta)] - \frac{1}{2} C(\Delta_t - \underline{\Delta}) + \delta \log[A (\frac{1}{2} + \frac{1}{2} D(\underline{\Delta})) y_t \delta / (1+\delta)] \quad (18)$$

Comparing (18) to utility under decentralized schooling described by (11) we observe that centralization maximizes children's income but inflicts a greater psychic cost on parents. Once adopted, centralized education is clearly preferable to decentralization in all future generations, but for the parent generation making the switch it involves the ex ante risk of a greater generation gap than it would have chosen under the decentralized system. This sacrifice is worthwhile, i.e., centralization is preferred to decentralization by the parent generation, only if this added psychic cost is outweighed by the material gain to the next generation. In any event, compared to the optimal path without political constraints derived in Section 4, the centralized solution induces overly rapid convergence to complete uniformity, thus imposing an excessive psychic cost on the parent generation.²⁵

At the other extreme, assume the second mover can reject the first mover's proposal and receive a full tax credit to set up a school system of its own, in which case the two groups revert to the decentralized equilibrium described in section 3. Then centralization must perform better than decentralized education: in each period expected social polarization can be no greater, and may be smaller, than under decentralization. Summing up,

Proposition 3. When the government has coercive powers to impose school curricula, centralization leads to more uniform schooling and faster income growth than decentralization, but only by imposing a greater psychic cost for parents, which may or may not outweigh its benefits. In any case, coercive centralization induces overly rapid convergence to complete uniformity, which parents find strictly inferior to the unconstrained Pareto optimum. Non-coercive centralization is a Pareto improvement over decentralized education.

6 Notes on empirical application

While the empirical measurement of social interactions raises substantial issues (Manski, 2000), there is a significant body of systematic, quantitative studies that develop explicit operational measures of social ties, trust, voluntarism and social participation, and relate them to measures of economic performance.²⁶ One strand of this burgeoning literature uses cross-country regressions to identify a positive effect on growth of various manifestations of social capital such as participation in voluntary associations, the degree of trust, and corruption (e.g., Knack and Keefer, 1997; Temple and Johnson, 1998; Rafael La Porta et al., 1998; Paul J. Zak and Knack, 2001). Another strand more closely related to the present analysis specifically focuses on the role of cultural diffraction within a society, and the destructive effects of ethnic strife. Contributions in this vein typically regress performance variables on measures of ethnolinguistic heterogeneity, such as the percentage of a country's population not belonging to its largest ethnic group, or the probability that two randomly drawn individuals belong to different groups. Paolo Mauro's (1995) cross-country analysis finds that such heterogeneity adversely affects the quality of services provided by the central government and generates political instability. Easterly and Levine's (1997) analysis of a cross-section of countries similarly finds that it promotes corruption and rent seeking, and leads to inefficient policies resulting in poor infrastructure, a lack of financial institutions and low educational achievement. They estimate that a one-standard-deviation decrease in ethnic heterogeneity increases productivity per worker by half a standard deviation and growth by a third of a standard deviation, inducing a gap of more than 2 percent between the growth rates of the most heterogeneous and most homogeneous countries. This leads them to conclude that ethnic heterogeneity is the main source of backwardness in Africa, a finding that Easterly's (2000) more recent work corroborates, with the qualification that good institutions can mitigate its adverse effects.²⁷ Other studies examine the effect of ethnic heterogeneity on the provision of public education—among

other public goods—in a cross-section of U.S. communities, and find it has a negative impact (Alesina et al., 1999; Claudia Goldin and Lawrence F. Katz, 1999). James M. Poterba (1997), among others, finds that racial heterogeneity negatively affects local public spending on education. Alesina and Eliana La Ferrara's (2000) evidence indicates that racial composition reduces the degree of participation in social activities, while Erzo F. P. Luttmer (2001) finds that welfare benefits are negatively related to racial heterogeneity. More directly, Glaeser et al. (1995) find that racial heterogeneity negatively affects US city growth, and Denise DiPasquale and Glaeser (1996), using both U.S. and international data, show that ethnic diversity is a significant determinant of urban unrest.

Our emphasis on polarization implies that operational measures of the extent of ethnic fragmentation should reflect not only the ethnic distribution of the population—e.g., the probability of two randomly drawn individuals belonging to different groups—but also the cultural distance between groups.²⁸ When fragmentation is linguistic, the extent to which different languages are mutually intelligible is significant—compare the close affinity between Russian and Ukrainian to the dissimilarity between Russian and Estonian—as is the proportion of people sharing an external common language, say, English in India. When fragmentation derives from religious differences, distance might be measured by the severity of religious strictures that limit social contact between groups, such as dietary laws, dress codes, rules of personal hygiene or other factors. In a more general context, the extent of intermarriage between groups (cf. Alberto Bisin and Thierry Verdier, 2000), or the extent of residential integration, might be used as measures of social proximity.

7 Concluding remarks

Public education has been, since its inception, an important socializing force. Working to build common norms, it facilitates interaction between members of a society who differ in

their cultural or religious backgrounds. As such, it has often played a key role in forging national identities and establishing centralized governments. Empirical research that ties economic performance to political stability and social homogeneity suggests that this has important economic implications.

In this paper we examine these implications in the analytical context of a model of endogenous growth in which education plays the dual role of building human capital and determining social orientation. These two dimensions interact through the adverse effect of social polarization on the productivity of human capital. We show that decentralized education in which different social groups separately operate independent, uncoordinated school systems leads to excessive polarization and hence less than optimal growth. The optimal trajectory involves more rapid reciprocal convergence of social orientations towards the middle ground.

Recognizing that such a trajectory may be difficult to implement in a political context in which all agents are identified with one group or another, we then go on to examine the possible outcomes of legislative bargaining over curriculum content in a representative democracy. Our analysis shows that while centralized schooling holds out the potential for a Pareto-improvement of welfare, such an improvement is not assured and depends on political circumstances. Coercive centralization of schooling results in overly rapid homogenization, and may yield less welfare than decentralized education.

There are several avenues for further extension and application of this approach. In a separate appendix we briefly indicate how social exclusion might be incorporated in the model, and also consider the implications of differently sized cultural groups, of non-logarithmic utility and of parents explicitly exerting a direct (home) influence on their children's cultural identity.²⁹ Other theoretical extensions include endogenizing the segregation of social groups, and adding institutional detail to the political process.

Empirically, our analysis suggests that econometric estimates of the contribution of education to growth and of the determinants of public involvement in education, conditioned on cultural and religious divisions, should consider not only the size distribution of ethnic groups but also the social distance between them. In addition, our results imply explicit testable hypotheses regarding the narrowing of ethnic wage differentials from one generation to the next, and the greater likelihood of religious rather than cultural divisions persisting in the steady state..

On a normative plane, our analysis indicates that the design and assessment of school reforms should take into account their impact on the socializing role of education, in addition to their effect on scholastic achievement. Education vouchers are a case in point. Popular support for vouchers is most often based on their offering better access to high-quality education, especially to children of disadvantaged families.³⁰ However, their impact on social cohesion may be no less important: prospective gains from improved scholastic performance must be weighed against potential losses from increased social fragmentation.

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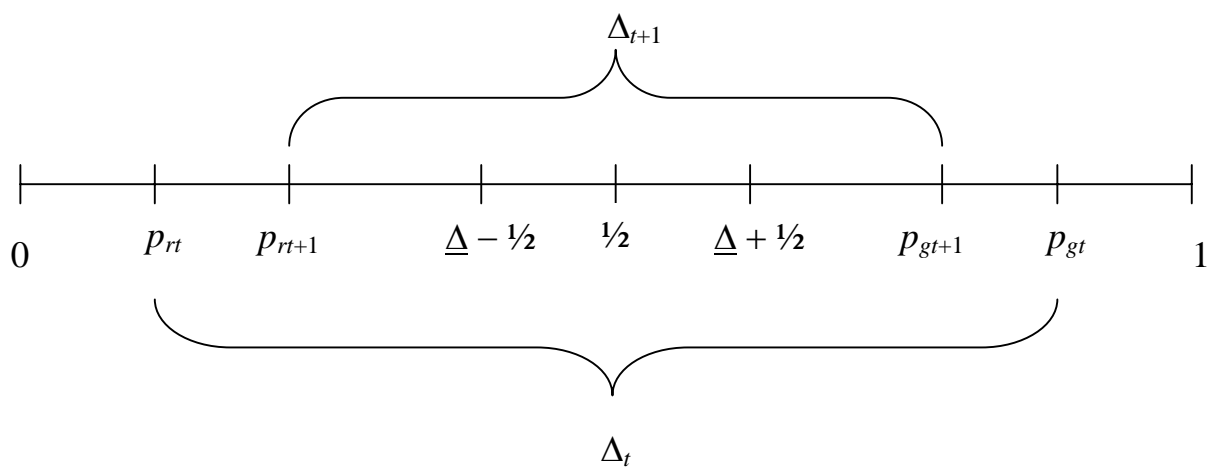
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FIGURE 1: The dynamics of social orientation under decentralized schooling



* Gradstein: Department of Economics, Ben-Gurion University, Israel, and Centre for Economic Policy Research; Justman: Department of Economics, Ben-Gurion University, Israel. Thanks to the anonymous referees for their helpful comments and suggestions, and to participants in the Israel Economics Association meetings, the 4th Euro–Mediterranean meetings and the Tel-Aviv University conference on political economy, and in seminars at Ben-Gurion University, Haifa University, the Hebrew University, Indiana University and Otago University.

¹ Robert J. Barro (1991) and N. Gregory Mankiw et al. (1992) are seminal empirical analyses of the effect of human capital on growth.

² Herschel I. Grossman (1991, 1993) explicitly models this cost, and Grossman and Minseong Kim (1997) elaborate on the role of education in reducing it.

³ This aspect of education—its role in reducing social tensions and consequent rent-seeking activities between different ethnic groups—is examined in Mark Gradstein and Moshe Justman (2000).

⁴ J. Stanley Metcalfe (1994) draws on an evolutionary model of biological diversity to highlight the advantages of technological diversity for economic performance. Martin L. Weitzman's (1992) analysis of the microfoundations of diversity concludes that it may be advantageous or detrimental. Here we focus on the negative impact on economic performance of people lacking the means to communicate effectively with each other.

⁵ We focus here on government's role in the determination of school curricula, abstracting from other important modes of intervention, e.g., in school finance.

⁶ Education does not have the technical attributes of a public good: it is largely appropriable and divisible. Papers that focus on the political economy of education finance include Roland Bénabou (1996, 2000), Raquel Fernandez and Richard Rogerson (1999), Gerhard Glomm and

B. Ravikumar (1992), Gilles Saint-Paul and Thierry Verdier (1993). Some of these papers (e.g., Bénabou, 1996, 2000) emphasize the adverse effect of heterogeneity in incomes.

⁷ A nation, or other political entity capable of implementing an education policy.

⁸ We assume that the choice of orientation is costless. One might think of h as the number of hours of weekly instruction in, say, mathematics, and of p as the language in which it is taught. Of course, other assumptions are also possible and could be incorporated in the model. Uniformity of cultural orientation might reduce schooling costs through economies of scale, or schooling costs might be an increasing function of the change in social orientation.

⁹ See Alberto Bisin and Verdier (2000) and references therein for a more detailed economic perspective on the disutility of having a child different from oneself.

¹⁰ Avner Greif (1993) and Joel Kotkin (1992) document the high intensity of economic activity within ethnic groups and its economic benefits for group members.

¹¹ We explicitly develop the microfoundations of the function D in an Appendix available on the *AER* website, and in Gradstein and Justman (2001).

¹² As we show in the Appendix, this is equivalent to assuming that, where D is decreasing, the elasticity of the probability of effecting a successful transaction (with respect to cultural distance) is smaller in magnitude than the elasticity of the productivity gain from cultural diversity once a transaction has been effected.

¹³ For simplicity, we assume here an equal chance of encountering any member of one's cohort. One could develop a theory of social exclusion on the premise that encounters with members of one's own group were more likely than encounters with members of other groups.

¹⁴ Joan M. Esteban and Debraj Ray (1994) develop an axiomatic approach to the measurement of polarization that could also be used to justify equation (1).

¹⁵ This implies that an individual's instrumental human capital and social orientation are

exclusively determined at school. We briefly discuss the possible influence of individual parental inputs in the Appendix.

¹⁶ This condition is both sufficient and necessary provided Δ_0 is too large to be a steady state, which holds if $C'(0) + \delta D'(\Delta_0) / [1 + D(\Delta_0)] < 0$, and provided $\underline{\Delta} > 0$. The economy converges to a non-interior, culturally uniform steady state at $\Delta = 0$ only if $\underline{\Delta} = 0$ and $C'(0) + \delta D'(0) / 2 \leq 0$.

¹⁷ $d\Delta_{t+1}/d\Delta_t = C'' / [C'' - 2\delta(D''(1 + D) - (D')^2) / (1 + D)^2]$. Strict inequalities hold if C is strictly convex and D is strictly decreasing.

¹⁸ Note that although the model we use generates endogenous growth, this is not essential for the core of the analysis. By setting the elasticity of output with respect to human capital less than one, a similar model can be formulated in which polarization has an inhibiting effect on transitional growth rates and steady state output.

¹⁹ Other papers dealing with these issues include George J. Borjas (1995), David M. Cutler and Glaeser (1997) and Lazear (1999). On the importance of ethnic ties in international trade see Greif (1993) and Kotkin (1992).

²⁰ This would not be the case if individuals derived utility from the utility of their offspring, in which case utility could only be derived as the solution of a differential equation (cf. Glenn C. Loury, 1981). Our assumption that individuals derive utility from their offspring's income greatly simplifies the exposition, and is frequently used in political economy analyses of educational systems.

²¹ When $\underline{\Delta} = 0$, $\Delta^* = 0$ if $-C'(0) / D'(0) < 2\delta$. If also $-C'(0) / D'(0) \geq \delta$ then decentralized schooling converges to a polarized steady state, though uniformity in the steady state is socially optimal. The opposite cannot hold: if the decentralized steady state is uniform then so is the optimal steady state.

²² In this light, the common decision of governments to provide socially uniform schooling rather than coordinated sectoral diversity, might be viewed as a “second-best” response within these constraints. A related difficulty arises when the central government is too weak to control a centralized school system. The relatively recent emergence of modern regulation of schooling by the state was made possible by the emergence of strong central governments.

²³ The evolution of educational structures in 19th century Europe, frequently marked as it was by bitter struggles between church and state, is telling in this regard (Andy Green, 1990).

²⁴ As $p_{rt} = \frac{1}{2} - \frac{1}{2} \Delta_t$ and $p_{gt} = \frac{1}{2} + \frac{1}{2} \Delta_t$, the red first-mover sets $p_{gt+1} = \frac{1}{2} - \frac{1}{2} \Delta_t + \underline{\Delta}$ and $p_{gt} - p_{gt+1} = \Delta_t - \underline{\Delta}$.

²⁵ To see this, note that risk aversion implies that all parents would be better off under centralization if they could agree ex ante that whoever makes the first move proposes school curricula symmetrically located at a distance of $\underline{\Delta}/2$ from the midpoint of the unit interval. Utility would then equal

$$U_t^m = \log[y_t/(1+\delta)] - C(\frac{1}{2}(\Delta_t - \underline{\Delta})) + \delta \log[Ay_t (\frac{1}{2} + \frac{1}{2} D(\underline{\Delta})) \delta/(1+\delta)]$$

which is greater than U_t^c from the convexity of C , but less than the utility achieved in the symmetric Pareto efficient solution.

²⁶ This work is strongly influenced by conceptual foundations laid down by James S. Coleman (1988), Francis Fukuyama (1990) and Robert D. Putnam (1993), among others.

²⁷ These findings are also supported by detailed case studies of education in ethnically diverse African countries (A. Babs Fafunwa and J. U. Aisiku, 1982). More recently, Edward A. Miguel (1999) reports on underfunding and poor facilities of primary schools in ethnically diverse districts in western Kenya. On the importance of institutions for mitigating ethnical strife see also Paul Collier (1998).

²⁸ In this spirit, Lisa Wu (1999) in her analysis of growth in sub-Saharan Africa, replaces the commonly used index of ethnolinguistic fractionalization from the *Atlas Narodov Mira*

(reprinted in Charles L. Taylor and Michael C. Hudson, 1972) with a measure of ethnic fragmentation based on work by D. G. Morrison et al. (1989) that takes into account degrees of cultural differences between groups. She finds that this measure has a statistically significant effect on growth where the previously used measure does not. The axiomatic approach of Esteban and Ray (1994) yields a set of polarization measures that are sensitive to the degree of cultural preferences, and which to the best of our knowledge have not yet been applied empirically.

²⁹ The Appendix is available on the *AER* website, and in Gradstein and Justman (2001).

³⁰ See John E. Chubb and Terry M. Moe (1990) for a comprehensive argument in favor of vouchers, Donald E. Frey (1992) for an opposite view, and Edwin G. West (1997) for an international survey. Fears that widespread use of vouchers will promote racial segregation are often voiced publicly, but most systematic analyses focus on academic achievement. Paul E. Peterson (1999) argues that vouchers have the potential to improve socioeconomic and racial integration if they are sufficiently generous and prohibit discrimination in admissions.